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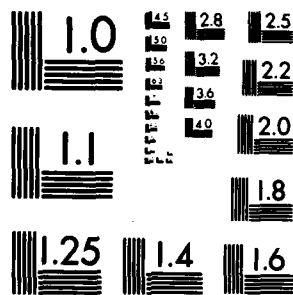
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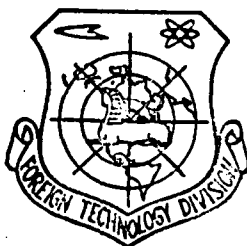
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by

H. Wehner



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THE OCCURRENCE OF THE SOUTHEAST WIND IN THE ELBE VALLEY

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A weather phenomenon typical for the Elbe Valley is the strong SSE wind which often lasts for days and has already been described by Warmbt [1]. As characteristic features of the weather conditions with particularly sever SSE wind, Warmbt found :

- 1) strong drop of the high-reaching, quasistationary anticyclones with nucleus over the Balkans;
- 2) low-lying inversion with strong temperature jump in Saxony;
- 3) falling air pressure during almost equidirectional and increasing with height flow above the Peplopause up to the 500 mbar level.



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The synoptic practice shows that these three conditions are indeed necessary but not sufficient for the arisal of the wind. A further important prerequisite is a cold air reservoir in the Bohemian Basin, which must be formed by the preceding weather development. To clarify the correlation between the arisal of the wind and major weather condition which precedes the onset, from the 25-year series of observations from Wahnsdorf [2] all periods were extracted in which at least on three successive days the predominant wind direction was SSE. There resulted 51 cases which were distributed among the individual months as follows:

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
9	6	2	—	1	1	—	2	2	4	12	12

In agreement with the results achieved by Warmbt, such periods have occurred chiefly in the months November to February, i.e., in the Winter half-year. They comprised a total of 201 days of which only 10 had a southeast attitude as major weather condition. The remaining 191 days were distributed among various major weather conditons as the following Table shows.

HM	SWa	Sa	Ws	BM	Sz	Wz	SWz	Ww	TB	TrW	Wa	TrM	TM
32	31	23	21	17	13	11	10	7	7	6	5	2	1

[[TRANSLATOR NOTE: The abbreviations are unknown and cannot be found in any available reference materials, other than as described in following text.]]

Thus 120 days are ascribed to anticyclonal major weather conditions, if the major weather condition TB in correspondence with its effect in Saxony belongs to this type, and 71 days to the cyclonal major weather conditions. 61 days had general weather conditions with predominantly zonal circulation and 64 days had conditions with primarily southerly meridional flow. The 73 days on which a general weather condition with mixed circulation prevailed in no case had northerly meridional flow, just as the three days which belonged to the type of major weather condition with prevailing northerly meridional flow, were represented only by the TrM and TM weather conditions, which do not unconditionally have to exhibit a northerly current in Saxony. The wind phenomenon thus never occurred during general weather conditions with northerly or easterly ground flow (NW, NE, HF, etc.). In contrast, a general weather condition with this flow direction frequently preceded the phenomenon which ensured the necessary supply of cold air in the Bohemian Basin. In Winter, fifteen weather conditions with indubitably northerly or easterly flow, such as NW, HN, TM, HF, NE, and Ww as well as in four cases the general weather condition SE could be established prior to the onset of the wind. Since in Winter the general weather condition HM is always associated with the formation of a ground cold air [?mass?]

and the end of a west attitude is generally accompanied by a all of these situation could create a cold air skin [sic] in the Bohemian Basin.

In the summer half-year seven general weather conditions with a northern flow arrangement (NW,N,TM,HF, and HNF) had preceded the wind periods. In four cases, a west attitude had ended shortly before the onset of the wind. Only in one case was a major weather condition if the type TrW determined prior to the days with SSE, which could hardly form the prerequisite for a cold air reservoir in the Bohemian Basin. Those weather conditions which occurred at the end of October followed an HM-type major weather condition, so that the cold air formation could have already been accomplished. It is thus shown that a general weather condition with a southwest flow direction took place prior to the onset of the SSE wind, on the contrary, generally during the period which exhibited this wind in the Elbe Valley. A precondition for the arising of the wind, however, was also a major weather condition which formed a cold air mass in the Bohemian Basin, which then came to drainage under high pressure influence of the following general weather condition.

In the above-introduced studies by Warmbt [1] the fact is indicated that the wind arising in this manner can not be clarified as an orographic effect of the Elbe Valley and there are no

observations concerning its regional extent yet available. On the basis of a typical case, of the weather conditions from 1-5 December 1948, the extent of the wind anomaly was examined with the utilization of the measurements of all Saxony climatological stations.

In the first days of December, 1948, a high pressure region was weather determining for Central Europe, which had been formed at the end of November after a thrust of polar air masses. Central Germany initially was in the direct nuclear region of the high pressure and had day-long cloudless, winter-type radiant weather. With the conversion of the general weather conditions at the beginning of December which paved the way for a southwest weather condition, the center of the high pressure which was initially over the alpine foothills wandered over over the Hungarian low plain toward the Balkans. Thereby it was slowly warmed. In the Bohemian Basin, however, there was a cold air remainder covered by the almost constantly negative temperature values from Prague. In the night of 5 December a first disturbance grazed central Germany, which temporarily brought cloud cover and also some drizzle. However, a quick pressure increase again created a high pressure region with a nucleus between the Oder and upper Weichsel [[rivers]]. At altitude the weather phenomenon was dominated by an independent high-altitude high, which shifted during 1-5 December from West to Eastern Europe.

Thus, after initially northeasterly high altitude currents, at the end of the period SSW winds were measured at altitude. While in the first days the high-altitude wind was ununiform, from 3 December on an increasing SW flow set in with altitude. With respect to the aerological make-up of the atmosphere, the measurements of the Dresden radiosonde launch site in the days exhibited the typical picture for weather conditions with SSE wind. At an average altitude of 886 m a strong inversion was measured, whose temperature at the pentaden center was five degrees higher than the ground value. The situation of the Peplopause, which varied between 580 and 1180 m, is verified by the measurements of Geisingberg at 823 m, which found itself in the cold southeast flow only occasionally.

The gradient wind turned from the 1st to 4th of December from WNW over W to WSW and on the 5th back to W. Correspondingly, from 1-5 Dec. prevailingly southwesterly wind was observed by the Saxony stations. In the Elbe Valley there set in the SSE wind mentioned at the outset. While on 1 Dec. only the Hinterhermsdorf and Sebnitz stations had wind from the SE, on 2 Dec. this region with southeasterly winds stretched across the Elbe Valley. Hinterhermsdorf, Sebnitz, Geisingberg, Dresden, Wahnisdorf, and Grossenhain, yes, even the Kamenz and Bautzen stations had winds from the E to SE. On this day, however, there was also another region with southerly or southeasterly winds covered by the crest stations of

Reitzenhain and Fichtelberg and the towns Annaberg and Karl-Marx-Stadt, of which the town of Annaberg already had weak southerly wind in the morning. On 3 Dec. the SE wind zone was particularly well expressed in the Elbe Valley and extended to beyond Hernnhut, Bautzen and Kamenz, while Zittau and Goerlitz reported southerly winds. Also on 4 and 5 December the stations including Grossenhain which lie directly in the Elbe Valley experienced thoroughly prevailing southeasterly wind. The strongest winds were observed in the pentaden center at the crest sites of the western Erz Mountains, while the northwest Erz foothills exhibited the weakest wind strengths. If the high values at Wahnsdorf and on the Collmberg are disregarded, which on the average had a wind strength of 4, in the area of Bautzen there was a further highest value with a wind strength of 3 as an average.

Even better than in the wind distribution for this condition, the particular flow relationships made themselves notable in the temperature field. The cold air which remain in the Bohemian Basin offered this SE flow a drainage possibility. Thus, the Elbe Valley wind appears as a cold current, in which the the diurnal maxima were little above the freezing point, while in the remainder of Saxony generally high values of over 10 °C were measured. Therefore the Elbe Valley also had the lowest temperatures of Saxony during the entire time. The warmest region was generally the northwest slope of

the Erz Mountains. Annaberg, frequently the warmest station, had almost constantly 12-degree higher temperatures than Hinterhermsdorf, although the latter lies some 230 m lower than Annaberg. The southerly or southeasterly winds observed in Annaberg and the western Erz Mountains can be explained as pure foehn winds, if they are observed on the days on which the inversion lie above 1000 m. Thus they have no direct correlation with the Elbe Valley winds. To further solidify this viewpoint, the change of the diurnal mean of air temperature from 1-4 Dec. was graphed. On these days no exchange of air mass took place. And yet decisive temperature changes are to be determined. In the portions of Saxony lying to the southwest of the Elbe a slight warming took place from 1-4 Dec., while the stations lying north and east of the Elbe recorded temperature drops. The main cooling was between the Elbe Valley and the Neise Valley at the headwaters of the Spree, in those regions thus, that also had south or southeasterly flow. It is thus shown that the SSEwind observed in Dresden during this condition was no local phenomenon, but rather was in correlation with all strong winds to the south observed in East Saxony. This obviously concerns a cold air drainage from the Bohemian Basin, which took place simultaneously through the passes formed by the Elbe, Spree and Neise.

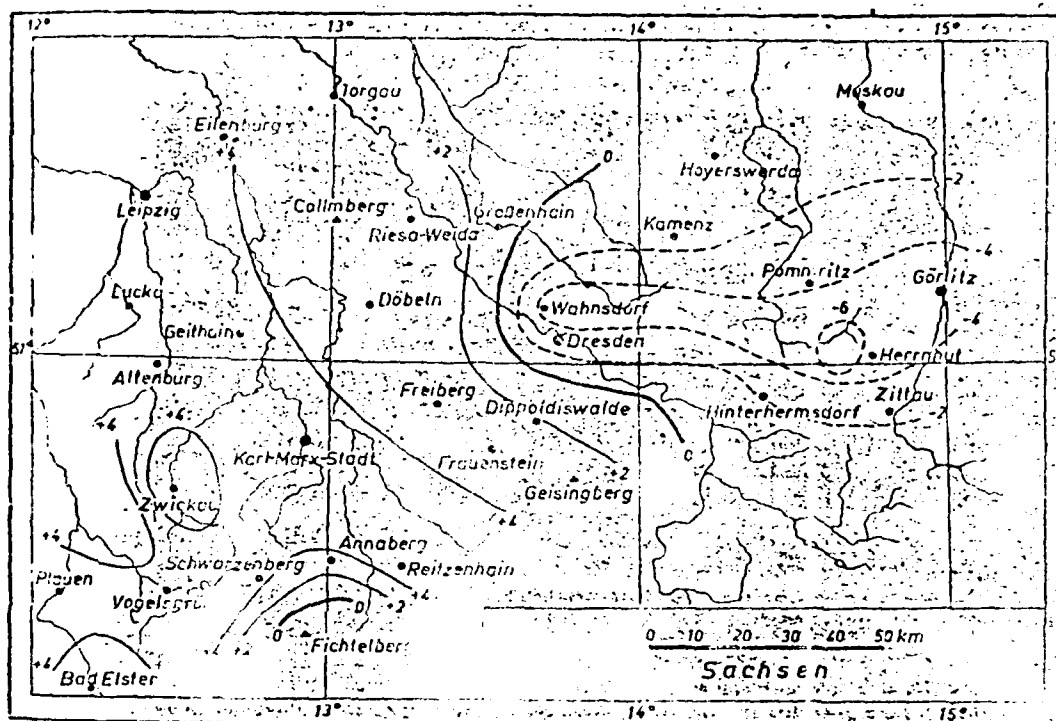


Figure 1. Change of the diurnal mean of air temperature from 1-4 December 1948. [[SACHSEN = Saxony]]

The position of the maximum cooling, however, also permits recognition that the center of the effect extending from the Elbe Valley to the Neise Valley was located in Lusatia. As already indicated by Warmbt, the wind is thus not to be explained as a local but rather a portion of a regional phenomenon, which arises between the east slope of the Erz mountains the the west slope of the Iser

Mountains and extends over all of East Saxony. With respect to altitude this jet stream is limited by as strong inversion and under the influence of the winds occurring in the Bohemian Forest [4] can also be designated the Bohemian Wind. In West Saxony the wind occurs in weakened form, if the inversion is located above the Erz Mountain crestline. As a foehn it is then, however, not distinguished by low temperatures, but by the low humidity. That the examined weather condition was truly typical for the occurrence of the wind, is shown by a view to the mean values, which up to now have been designated as local orographic influence, but since then can be traced back to a common cause. According to Pleiß the wind direction SSE in Wahnsdorf at 10.7%, exhibits the third greatest frequency, while in Bautzen with 11.1%, a secondary frequency maximum is attained. In Zittau the secondary maximum is formed with 10.5%, by the SSW direction. According to the Klimakunde [6] in the Goerlitz the prevailing wind direction is south. In all of these cases the great frequency of these wind directions is not alone the effect of the local orography, rather created by the frequently occurring jet streaming between Geisingberg and Jeschken. Not only the fact of the great frequency of these wind directions on the annual mean and in particular in the winter half-year, but also the divergence occurring thereby (Wahnsdorf SSE, Zittau SSW) support the explanation of the wind anomaly as a jet stream between the Erz and Iser Mountains (Fig. 2). Thus the magnitudes derived by Pleiß, which give the frequency excess of the

ground wind direction in contrast to the gradient wind direction, with 305°/ for SSE direction at Wahnsdorf, 230°/ south direction at Bautzen and 208°/ in Zittau also gain significance. That this cold air outflow is constantly associated with high speeds, is demonstrated by the secondary velocity maxima on the annual mean, which lie at the SE direction in Wahnsdorf and Bautzen and at the SSE in Zittau. In Winter in Bautzen one even finds the velocity maximum with a strength of 5 and on the annual mean a secondary velocity maximum for strong winds at the south direction.

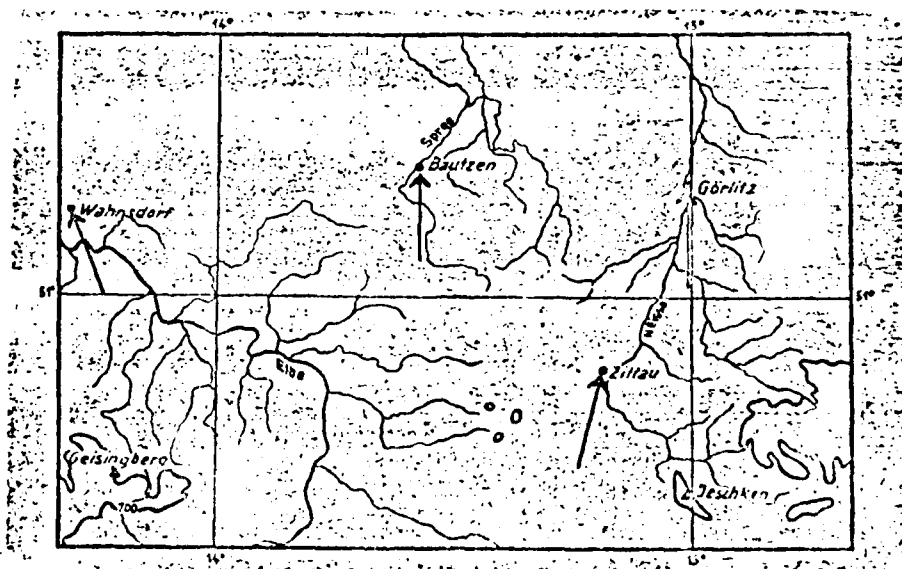


Figure 2. Topography of the 700 m-level surface of East Saxony and

wind direction maxima of the Bohemina Wind in Lusatia.

The evaluation of the weather condition from 1-5 December 1948 and the consideration of the mean values show thus that the wind which appears in the Elbe Valley as an SSE wind extends as a strong south wind over all East Saxony and is connected to definite prerequisites. Its occurrence, just as the Bohemian Wind in the Bohemian Forest requires a cold air thrust which leaves a cold air remainder in the Bohemian Basin. When the way is paved for a transformation of the general weather conditions under the influence of an anticyclone lying over southeast Europe, then a drainage of the cold air from the Bohemian Basin is accomplished below a strong inversion. According to whether for this condition the cyclonal center is located over southern or western Europe, the Bohemian Wind sets in in Lusatia in the direction of the pressure drop. As a strong, gusty, and dry descending wind it causes the unpleasant physiological and climatological effects described by Warmbt [1] and Schramm [4]. Thereby the values of wind velocity occurring in the area of Bautzen could only slightly fall short of those measured in the Elbe Valley. Due to the lack of a suitable station, synoptically reporting or equipped with recording devices, in Upper Lusatia the presence of this effect there has not been recognized to date.

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